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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09-604,218	06/27/2000	Tulin Kuzulugil Hidayetoglu	98-R-CLU-363	4131

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EXAMINER

TSOY, ELENA

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/604,218

Applicant(s)

HIDAYETOGLU, TULIN
KUZULUGIL

Examiner

Elena Tsoy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11-15 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8, 11-15 and 20-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a)
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 10, 2003 has been entered.

Response to Amendment

2. The amendment filed on January 10, 2003 has been entered. Claims 9, 10 have been cancelled. Claims 1-8, 11-15, 20-23 are pending in the application.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5, line 2, "Kevlar" is a trademark, which identifies the source of the fibers rather than the fibers themselves (See specification, page 11, 15-19). "Kevlar" renders the claim indefinite because it is subject to changes. The trademark in the claim should be replaced by generic description of the fibers. For examining purposes the Kevlar fibers were interpreted according to the specification (See specification, page 11, 15-19) as aramid fibers.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-8, 11, 12, 20, 21, 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Booher (US 5,156,787) in view of Miyamoto et al (US 6,001,440).

As to claim 1-8, 11, 12, 20, Booher discloses a clutch pad (See column 2, lines 65-66; column 3, lines 1-6) with improved wear resistance (See column 1, lines 18-23; 30-33), comprising a functionally graded material including a composite material having heat and wear resistant fibers (See column 2, lines 28-45) comprising aramid fibers (See column 2, line 33) therein impregnated with a resin (See Fig. 1; column 1, line 62); and a plurality of heat conducting elements situated within said functionally graded material in a selected orientation and spatial distribution such as evenly distributed carbon fibers (filaments) oriented perpendicular to a friction surface (See Fig. 2; column 2, lines 29-34, 61-68; column 3, lines 3-6) and (uniformly dispersed) metal components such as copper powder, copper alloy powder (See column 2, lines 58-60) to enhance the dissipation of heat (See column 2, lines 58-60).

The Examiner Note: a clutch pad reads on claimed clutch facing material because the clutch pad is supposed to be located on the "face" of the clutch with one surface engaging a movable, engageable part.

Booher fails to teach that the heat conducting elements are situated within said functionally graded material with a varying concentration so that the concentration of the heat

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conducting elements decreases from the first engaging friction surface to the second non-engaging surface for transferring heat away from the first friction surface (Claim 1) so that the heat conducting elements comprise a greater density on said first friction surface than non-engaging surface (Claims 8, 20).

Miyamoto et al teach that a composite material containing heat conducting elements such as copper powder (See column 2, lines 57-60) dispersed therein with a concentration gradient (See column 2, lines 16-18), e.g., in the direction of the thickness of a film (See column 2, lines 36-43), so that the concentration of the heat conducting elements decreases from the hot surface, has improved thermal conductivity in addition to excellent mechanical characteristics (See column 4, lines 32-36; column 6, lines 18-32; column 7, lines 25-33) compared to a film containing uniformly dispersed heat conducting elements (See column 1, lines 37-43); and therefore may be used in various fields as a medium for positive heating or, conversely, as a *heat dissipating* medium for transferring heat away from the hot surface for the use in application fields where heat accumulation may cause problems (See column 7, lines 43-47).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified a composite material of Booher by varying concentration of the heat conducting elements so that their concentration decreases from the first engaging friction (hot) surface to the second non-engaging surface with the expectation of providing the desired improved thermal conductivity in addition to excellent mechanical characteristics, as taught by Miyamoto et al, in order to enhance the dissipation of heat from the hot first friction surface.

As to claims 21, 23, Booher in view of Miyamoto et al fails to teach that the concentration of the heat conducting elements on the first friction surface ranges between about

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22.5% to about 42.5 wt% (Claim 21); and the decrease in concentration of the heat conducting elements is over a depth of 0.05-0.1 inch (Claim 23).

Miyamoto et al further teach that the higher the concentration of the heat conducting elements the better thermal conductivity (See column 4, lines 32-39). Thus, heat dissipation can be controlled not only by concentration gradient of the heat conducting elements in the thickness direction, but also by the amount of the heat conducting elements. In other words, concentration of the heat conducting elements and pattern of concentration gradient in thickness direction are result-effective variables in heat dissipating process.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Also, it is held that concentration limitations are obvious absent a showing of criticality. Akzo v. E.I. du Pont de Nemours 1 USPQ 2d 1704 (Fed. Cir. 1987).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have discovered the optimum or workable ranges of concentration of the heat conducting elements and concentration gradient in thickness direction (including those of claims 21, 23) in a clutch pad of Booher in view of Miyamoto et al by routine experimentation in the absence of a showing of criticality.

7. **Claims 13-15, 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Booher (US 5,156,787) in view of Miyamoto et al (US 6,001,440), as applied above, further in view of Nakamoto et al (US 6,098,612).

Booher in view of Miyamoto et al, as applied above, fails to teach that the metal components in a composite material such as copper components (Claim 14) are oriented perpendicular to the engaging surface (Claim 15), and the copper components are copper threads (Claim 13) being woven with the aramid fibers (Claim 22).

Nakamoto et al teach that a woven fabric containing combination of synthetic yarns with a metal powder dispersed in a resin material is a functionally equivalent to a woven fabric made up of metallic fibers such as copper threads and fibers other than the metallic fibers for the use as high heat diffusion material (See column 16, lines 38-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used copper threads woven in with other fibers instead of copper powder in a composite material of Booher in view of Miyamoto et al since Nakamoto et al teach that a woven fabric containing synthetic yarns with a metal powder dispersed in a resin material is functionally equivalent to a woven fabric made up of metallic fibers such as copper threads and fibers other than the metallic fibers for the use as high heat diffusion material.

Booher, as applied above, further teaches that heat conducting carbon fibers woven in with other fibers such as aramid fibers (See column 2, lines 31-34) oriented perpendicular to a friction surface (See Fig. 2; column 2, lines 29-34, 61-68; column 3, lines 3-6) enhance the dissipation of heat (See column 2, lines 58-60).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have oriented heat conducting copper components such as copper threads woven in with other fibers in a composite material of Booher in view of Miyamoto et al perpendicular to a friction surface with the expectation of providing the desired enhanced dissipation of heat since

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Booher teaches that heat conducting fibers oriented perpendicular to a friction surface enhance dissipation of heat.

Response to Arguments

8. Applicants' arguments filed January 10, 2003 have been fully considered but they are not persuasive.

(A) Applicants argue that Miyamoto et al cannot remedy Booher because Miyamoto et al relate to a thin film material; and Miyamoto et al do not mention clutch material or even a friction material.

The Examiner respectfully disagrees with this argument. First of all, Miyamoto et al teach effect of concentration gradient (all other things being equal) by comparing a thermal conductivity of a thin film having uniformly dispersed heat conducting elements with a thermal conductivity of the *same thin* film having the heat conducting elements dispersed with a concentration gradient. Furthermore, Miyamoto et al teach that the thickness of the film may vary depending on the intended use but, *generally*, of 20 microns to 300 microns (See column 3, lines 30-34). In other words, thickness of film in Miyamoto et al is irrelevant, as long as concentration gradient of the heat conducting elements in the thickness direction is achieved. Therefore, the teaching of Miyamoto et al can be applied to films of any thickness including a clutch material of Booher (which is thicker than 300 microns), especially considering the fact that the concentration gradient can be achieved more easily in thicker films than in thin films.

Moreover, changes in size/proportion were held to obvious. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled."

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531 F.2d at 1053, 189 USPQ at 148.). In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have scaled up a heat dissipating material of 20-300 microns of Miyamoto et al to heat dissipating material of thickness more than 300 microns since Miyamoto et al teach that a film as thin as 20 microns can be scaled up to the film of 300 microns, which is 15 times thicker; and Miyamoto et al do not put any upper thickness limit.

(B) Applicants argue that there is no motivation to modify Booher with Miyamoto et al.

The Examiner respectfully disagrees with this argument. As was discussed above, Miyamoto et al teach that heat conducting elements dispersed in a film with a concentration gradient improves thermal conductivity compared to a film containing uniformly dispersed heat conducting elements and therefore, may be used in various fields as *heat dissipating* medium for transferring heat away from the hot surface for the use in application fields where heat accumulation may cause problems. Therefore, there is a clear motivation to apply teaching of Miyamoto et al to a *heat dissipating* medium of Booher in order to improve thermal conductivity of the heat dissipating medium of Booher.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (703) 605-1171. The examiner can normally be reached on 9:00-5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

E. Tsoy

Elena Tsoy
Examiner
Art Unit 1762

February 25, 2003